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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.
09/146,839	09/03/98	SRINIVASAN A	MI22-1017

EXAMINER	
MAI, A	
ART UNIT	**PAPER NUMBER**
2814	

021567
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MM91/0321

DATE MAILED: 03/21/01

Please find below and/or attached an Office communication concerning this application or proceeding.

Commissioner of Patents and Trademarks

Office Action Summary	Application No. 09/146,839	Applicant(s) SRINIVASAN ET AL.	
	Examiner Anh D. Mai	Art Unit 2814	

-- The MAILING DATE of this communication appears on th cover sheet with th correspondenc address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *18 January 2001* .

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1,4-8,10,13-20,22-28,36,38 and 39* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1,4-8,10,13-20,22-28,36,38 and 39* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claims _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are objected to by the Examiner.

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved.

12)☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. § 119

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).

Attachment(s)

15) ☐ Notice of References Cited (PTO-892)
16) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
17) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
18) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
19) ☐ Notice of Informal Patent Application (PTO-152)
20) ☐ Other: .

DETAILED ACTION

Response to Amendment

1. The amendment filed August 29, 2000 is objected to under 35 U.S.C. 132 because it introduces new matter into the disclosure. 35 U.S.C. 132 states that no amendment shall introduce new matter into the disclosure of the invention. The added material which is not supported by the original disclosure is as follows: the temperature "in excess of 500 °C but less than 630 °C".

Applicant is required to cancel the new matter in the reply to this Office Action.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claims 38 and 39 are rejected under 35 U.S.C. 112, first paragraph, as containing subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

There does not appear to be a specific written description of the claim limitation "the temperature in excess of 500 °C but less than 630 °C" in the application as filed.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

3. Claims 1, 4-7, 10, 16, 17 and 36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vassiliev (U.S. Patent No. 5,876,798).

Vassiliev teaches a method of forming a fluorine doped insulating material substantially as claimed including:

providing a substrate (3) within a reaction chamber, the reaction chamber controlled within a range of temperatures above 400 °C but not greater than about 700 °C;

providing reactants comprising silicon, fluorine and ozone within the reaction chamber; and

depositing an insulating material, comprising fluorine, silicon and oxygen onto the substrate from the reactants, wherein the depositing occurs with a plasma being present in the reaction chamber.

Regarding the deposition rate, it is well known in the art that the deposition rate is readily determined by the input of the reactant gases. The depositing rate does not appear to be critical.

Given the teaching of the reference, it would have been obvious to one having ordinary skill in the art at the time of invention to determine the optimum deposition rate of the fluorine

doped insulating material. See In re Aller, Lacey and Hall (10 USPQ 233-237) "It is not inventive to discover optimum or workable ranges by routine experimentation."

With respect to claims 4-6, the reactants of Vassiliev comprises silicon and fluorine within a common molecule (FTES).

With respect to claim 7, the fluorine in the insulating material of Vassiliev is present in Si-F bonds.

With respect to claim 10, the pressure within the reaction chamber of Vassiliev is within the claimed range.

With respect to claims 16 and 17, the reactants of Vassiliev comprise a molecule that includes both Si and F (FTES), and another molecule that includes Si without F (TEOS).

With respect to claim 36, the deposition rate has been discussed above.

4. Claim 8 is rejected under 35 U.S.C. 103(a) as being unpatentable over Vassiliev '798, as applied to claim 1 above, and further in view of Homma (U.S. Patent No. 5,288,518).

Vassiliev teaches all of the features of the claim with the exception of atomic percentage of fluorine in the insulating material.

However, Homma '518 teaches the atomic percentage of fluorine in the fluorine doped insulating material is within the claimed range.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to form fluorine doped insulating material of Vassiliev having the atomic percentage of fluorine as taught by Homma to achieve a low dielectric constant.

Further, no criticality has been established.

Given the teaching of the reference, it would have been obvious to one having ordinary skill in the art at the time of invention to determine the optimum atomic percentage of fluorine in the fluorine doped insulating material. See In re Aller, Lacey and Hall (10 USPQ 233-237) "It is not inventive to discover optimum or workable ranges by routine experimentation."

5. Claims 13-15 and 22-28 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vassiliev '798 as applied to claims 1 above, and further in view of Kirchhoff et al. (U.S. Patent No. 6,057,250).

With respect to claims 13-15, 23 and 25, Vassiliev teaches all of the features of the claim with the exception of further includes boron and phosphorous in the reactant gases.

However, Kirchoff teaches forming fluorine doped insulating material further includes boron and phosphorous.

Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to include boron and phosphorous in the fluorine doped insulating material of Vassiliev as taught by Kirchoff to lower the reflow temperature.

With respect to claims 22 and 26, the boron-containing precursor of Kirchhoff is TEB.

With respect to claims 24 and 27, the phosphorous-containing precursor of Kirchhoff is TEPO.

With respect to claim 28, see above.

6. Claims 18-20, 38 and 39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Vassiliev (U.S. Patent No. 5,876,798).

Vassiliev teaches a method of forming a silicon oxide having Si-F bonds substantially as claimed including:

providing a reaction chamber at a temperature in excess of 400 °C but less than 700 °C;

positioning a substrate (3) within the reaction chamber;

providing an ozone comprising reactant and a precursor having Si-F bonds to the substrate within the reaction chamber; and

causing a silicon oxide having Si-F bonds, to deposit onto the substrate within the reaction chamber.

Regarding the deposition rate, it is well known in the art that the deposition rate is readily determined by the input of the reactant gases. The depositing rate does not appear to be critical.

Given the teaching of the reference, it would have been obvious to one having ordinary skill in the art at the time of invention to determine the optimum deposition rate of the fluorine doped insulating material. See In re Aller, Lacey and Hall (10 USPQ 233-237) "It is not inventive to discover optimum or workable ranges by routine experimentation."

With respect to claim 19, the precursor having Si-F bonds of Vassiliev is FTES.

With respect to claim 20, the deposition of Vassiliev occurs with a plasma being present in the reaction chamber.

With respect to claim 38, insofar as understood by examiner, the pressure in the reaction chamber of Vassiliev is within the claimed range and the temperature is around 500 °C. However, the temperature range does not appear to be critical.

Given the teaching of the references, it would have been obvious to one having ordinary skill in the art at the time of the invention was made to determine the optimum temperature of the deposition chamber. See In re Aller, Lacey and Hall (10 USPQ 233-237) "It is not inventive to discover optimum or workable ranges by routine experimentation."

With respect to claim 39, see above.

Response to Arguments

7. Applicant's arguments with respect to Schuegraf '644 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Anh D. Mai whose telephone number is (703) 305-0575. The examiner can normally be reached on 8:30AM-5:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Olik Chaudhuri can be reached on (703) 306-2794. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 308-7722 for regular communications and (703) 308-7722 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0956.

A.M
March 16, 2001

Olik Chaudhuri
Supervisory Patent Examiner
Technology Center 2800